Maria [Masha] Okounkova

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I am a Flatiron Research Fellow at the Center for Computational Astrophysics at Simons Foundation Flatiron Institute in New York City. My research is in numerical relativity, and I am primarily interested in using numerical relativity to test general relativity through gravitational wave observations. I am a member of the Simulating Extreme Spacetimes (SXS) collaboration and the LIGO Scientific Collaboration (LSC).

Scientific Interests

Numerical relativity, binary black holes, gravitational waves, theories of gravity beyond general relativity, testing general relativity with gravitational wave observations, black hole quasi-normal modes, black hole shadows, code development for numerical relativity

Academic positions

Aug 2019 - present **Flatiron Institute Center for Computational Astrophysics (CCA)**, *Flatiron Research Fellow*, Member of Gravitational Waves and Compact Objects groups.

Education

2014 - 2019 **California Institute of Technology (Caltech)**, PhD in physics.
advised by Saul Teukolsky

2010 - 2014 **Princeton University**, B.A. in physics, certificate in applications of computing.
magna cum laude

Selected Publications

[10] **Maria Okounkova**. *Revisiting non-linearity in binary black hole mergers.* arXiv:2004.00671 Submitted to Phys. Rev. D., Apr 2020

[9] **Maria Okounkova**. *Numerical relativity simulation of GW150914 in Einstein dilaton Gauss-Bonnet gravity.* arXiv:2001.03571 Submitted to Phys. Rev. D., Jan 2020

[8] **Maria Okounkova**, Leo C. Stein, Jordan Moxon, Mark A. Scheel, and Saul A. Teukolsky. *Numerical relativity simulation of GW150914 beyond general relativity.* arXiv:1911.02588 Submitted to Phys. Rev. D., Nov 2019

[7] **Maria Okounkova**. *Stability of rotating black holes in Einstein dilaton Gauss-Bonnet gravity.* Phys. Rev. D 100:124054, Dec 2019

[6] **Maria Okounkova**, Leo C. Stein, Mark A. Scheel, and Saul A. Teukolsky. *Numerical binary black hole collisions in dynamical Chern-Simons gravity.* Phys. Rev. D 100:104026, Nov 2019

[5] Michael Boyle et al. (inc **Maria Okounkova**), *The SXS Collaboration catalog of binary black hole simulations* Class. Quant. Grav., April 2019

[4] **Maria Okounkova**, Mark A. Scheel, and Saul A. Teukolsky. *Evolving Metric Perturbations in dynamical Chern-Simons Gravity.* Phys. Rev. D 99:044019, Feb 2019

[3] **Maria Okounkova**, Mark A. Scheel, and Saul A. Teukolsky. *Numerical black hole initial data and shadows in dynamical Chern-Simons gravity.* Class. Quant. Grav., Feb 2019

[2] Swetha Bhagwat, **Maria Okounkova**, Stefan W. Ballmer, Duncan A. Brown, Matthew Giesler, Mark A. Scheel, and Saul A. Teukolsky. *On choosing the start time of binary black hole ringdowns.* Phys. Rev. D 97:104065, May 2018.

[1] **Maria Okounkova**, Leo C. Stein, Mark A. Scheel, and Daniel A. Hemberger. *Numerical binary black hole mergers in dynamical Chern-Simons gravity: Scalar field.* Phys. Rev. D 96:044020, Aug 2017.

Invited Talks and Workshops

Dec 2019 **NYU**, Guest lecture in general relativity course.

Nov 2019 **University of Amsterdam**, Gravitational Wave Probes of Fundamental Physics workshop.

Oct 2019 **NYU Center for Cosmology and Particle Physics**, Astro seminar.

Dec 2018 **Cornell University**, Gravity Lunch Seminar.

Nov 2018 **UT Austin**, Invited Seminar.

Nov 2018 **Princeton University**, Princeton Gravity Initiative Lunch Seminar.

Sep 2018 **Perimeter Institute**, Strong Gravity Seminar.

Aug 2018 **Cal State Fullerton**, GWPAC High Performance Computing Workshop.

July 2018 **Simons Summer Workshop**, Forefronts in Cosmology and Numerical General Relativity.

June 2018 **Centro de Ciencias de Benasque**, Numerical Relativity beyond General Relativity workshop.

April 2018 **Caltech**, Theoretical astrophysics seminar.

Jan 2018 **Keck Institute for Space Sciences**, The Architecture of LISA Science Analysis.

Dec 2017 **Caltech**, LIGO seminar.

Honors

June 2019 **Kip Thorne Prize**, *for Excellence in Theoretical Physics*, Caltech.

June 2018 **John Stager Stemple Memorial Prize**, *for best performance on oral candidacy exam and research progress*, Caltech.

Mar 2018 **American Physical Society DGRAV prize**, *for best student talk at PCGM34*, Caltech.

Oct 2017 **Oculus Prize**, *Maestro team*, Hack Music LA.

Oct 2017 **Amazon Prize**, *Maestro team*, Hack Music LA.

2014-2016 **Dominic Orr Graduate Fellowship**, *full funding for first two years of research*, Caltech.

July 2016 **Hartle Award**, *for best talk in numerical relativity session*, GR21 conference.

Nov 2015 **Theoretical Astrophysics in Southern California prize**, *for best student talk*, Cal State Fullerton.

June 2014 **Kusaka Memorial Prize in Physics**, *for top graduating seniors in physics*, Princeton University.

June 2013 **Allen G. Shenstone Prize in Physics**, *for top juniors in physics*, Princeton University.

Service and Leadership

2019 - present **Executive committee member**, *Simulating eXtreme Spacetimes collaboration.*

2019 - present **Student-Postdoc Advocate**, *Simulating eXtreme Spacetimes collaboration.*

2019 - present **Journal Referee**, *APS Physical Review D, APS Physical Review Letters.*

2017-2019 **Organizing committee member**, *Caltech/JPL Association for Gravitational-Wave Research.*

2018 **Conference organizer**, *Pacific Coast Gravity Meeting (PCGM) 34*, Caltech.

2016-2017 **Graduate student organizer**, *Theoretical astrophysics including relativity group*, Caltech.

2015-2016 **Numerical relativity group discussion leader**, Caltech.

Teaching and mentorship

2016-2017 **Teaching Assistant**, computational physics sequence (Ph20: Introduction to the Tools of Scientific Computing, Ph21: Tools for Data Analysis, Ph 22: Tools for Numerical Methods), Caltech.

Summer 2016 **Caltech SURF mentor**, Caltech.

2012-2014 **Laboratory Teaching Assistant**, computer science sequence (COS 126: Introduction to Computer Science, COS 217: Introduction to Programming Systems, COS 226: Algorithms and Data Structure), Princeton University.

Outreach

I regularly participate in community science nights at local schools, guest lectures in high school and college courses, and astronomy outreach events including Astronomy on Tap. For an example of my public outreach talks, please see a lecture on computational physics I gave to the general public at Caltech.

References

Prof. Saul Teukolsky
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Research Prof. Mark Scheel
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Asst. Professor Leo Stein
University of Mississippi
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Prof. Will Farr
Flatiron CCA / Stony Brook University
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